Data Documentation for MARMAP CPUE Index Information

I. MARMAP index for Black Sea Bass

Gear types chosen for index

The black sea bass life history group chose to use the inshore index for blackfish trap and Florida trap as well as the chevron survey for 1990-2001. Samples collected during 1988-1989 are not to be included because the gear were tethered from the boat. There is some talk of using hook and line from the inshore index during 1980-1987.

Florida trap, Blackfish trap, chevron trap and hook and line gear have been the dominant gear types used by MARMAP since 1978. Florida trap, blackfish trap, and hook and line gear had been used consistently from 1981-1987. These gear types were used at 13 study areas that included eight live bottom areas ~20 fathoms distributed from Onlsow Bay, NC to Fernandina Beach, FL during 1981-1987. These live bottom areas were sampled with Florida trap, blackfish trap, and hook and line gear. Four shelf edge areas off SC (30 fathoms) were also sampled with Florida trap and hook and line gear during 1983-1987.

All four gear types were fished synoptically from an anchored research vessel during 1988-1989. The MARMAP group decided that these samples should not be used since they represented a methodological change.

From 1990-2001, chevron traps have been deployed from randomly selected stations from south of Cape Canaveral, FL to Cape Lookout, NC. Trapping and hook and line gear has been used inside of 50 fathoms. Three different surveys have been conducted for reef fishes over the years.

Inshore Live Bottom Survey

Conducted with blackfish traps, Florida traps and hook and line gear from 1981-1987 at 13 areas from NC to northern FL.

Shelf Edge Survey

Conducted with Florida traps and hook and line at four locations off SC.

Chevron trap survey

Conducted with chevron traps and hook and line gear at random locations from NC to FL. Approximately 350-400 random stations sampled from a data base of over 2,000 locations from 1990 to present.

Mean CPUE of fish caught with traps or hook and line gear is calculated for each year by species as:

$$Mean\ CPUE\ (no.\ fish\ per\ trap\text{-}hr.) = \frac{\sum \frac{no.\ fish\ caught}{soak\ time\ (hr.)}}{no.\ samples}$$

CPUE is calculated in a similar manner for hook and line gear with the exception that soak time (duration) is multiplied by three for samples taken before 1988 since three individuals fished on a collection. Only one individual fished on each collection from 1988-2001.

Locations for the shelf edge study areas were: 3215, 7909; 3216, 7909; 3222, 7901 and 3226, 7956. The sites are ~ 50 m deep with a bottom type that consists of rock outcroppings and 1-2 m of relief. Locations of inshore index stations were: 3140, 8020; 3230, 7943; 3215,7943; 3255, 7908; 3248, 7938; 3317, 7826, 3251, 7814; 3329, 7815; 3318, 7853; 3340, 7843; 3344, 7717; 3355, 7746; 3409, 7647.

Description of the MARMAP monitoring data set

Included on CD, is a data set in ASCI "CPUE" that includes MARMAP monitoring reef fish data since 1978. The SAS program used to calculate CPUE is:

```
OPTIONS MISSING=' '  NODATE ERRORS=2;
DATA INITIAL; INFILE 'C:\saw\bsb\CPUE' LRECL = 421;
INPUT PID 1-3 COLL 4-9  GEAR $10-12 SPECIES $16-19 EST $29 @23 TOTWGT
6.3NUM 30-34 @35 SUBWGT 5.2 MEAS 40-41 DAY 234-235 MONTH 236-237
YEAR 238-239 VESSEL 244-245 LAT 330-334 LONG 335-339 @287 STRATA
$CHAR4.
DEPTH 367-369 DUR 370-372 CC 377 NAME $385-420
   LEN1 43-45 FR1 46-48 LEN2 49-51 FR2 52-54
   LEN3 55-57 FR3 58-60 LEN4 61-63 FR4 64-66
   LEN5 67-69 FR5 70-72 LEN6 73-75 FR6 76-78

   LEN7 79-81 FR7 82-84 LEN8 85-87 FR8 88-90
   LEN9 91-93 FR9 94-96 LEN10 97-99 FR10 100-102
   LEN11 103-105 FR11 106-108 LEN12 109-111 FR12 112-114

   LEN13 115-117 FR13 118-120 LEN14 121-123 FR14 124-126
   LEN15 127-129 FR15 130-132 LEN16 133-135 FR16 136-138
   LEN17 139-141 FR17 142-144 LEN18 145-147 FR18 148-150

   LEN19 151-153 FR19 154-156 LEN20 157-159 FR20 160-162
   LEN21 163-165 FR21 166-168 LEN22 169-171 FR22 172-174
   LEN23 175-177 FR23 178-180 LEN24 181-183 FR24 184-186

   LEN25 187-189 FR25 190-192 LEN26 193-195 FR26 196-198
   LEN27 199-201 FR27 202-204 LEN28 205-207 FR28 208-210
   LEN29 211-213 FR29 214-216 LEN30 217-219 FR30 220-222 SITE 400;

* NOTE:  If Hnl before 1988 is used, Duration is times three
         since three people fished on a single collection.;
IF CC > 2 OR CC = 0 THEN DELETE;
 IF GEAR='324';
PROC SORT DATA=INITIAL; BY COLL GEAR;
```

```
DATA GL; SET INITIAL; BY COLL GEAR;
DROP SPECIES EST TOTWGT NUM SUBWGT;
IF FIRST.COLL OR FIRST.GEAR;
PROC SORT DATA=GL; BY YEAR SITE GEAR;
PROC MEANS MEAN SUM N STD; BY YEAR SITE GEAR;
 VAR DUR;
OUTPUT OUT=DURATION MEAN = DURMEAN
                    SUM = DURSUM
                      N = DURN
                    STD = DURSTD;
TITLE 'SAMPLING DURATION STATS BY SITE AND GEAR';
PROC SORT DATA=GL; BY GEAR;
PROC MEANS MEAN SUM N STD; BY GEAR;
 VAR DUR;
OUTPUT OUT=DURAT    MEAN = DURMEAN
                    SUM = DURSUM
                      N = DURN
                    STD = DURSTD;
TITLE 'SAMPLING DURATION STATS BY GEAR';
DATA PA272; SET INITIAL;

IF SPECIES='A177' AND GEAR='074' THEN OUTPUT PA272;
IF SPECIES='A177' AND GEAR='324' THEN OUTPUT PA272;
IF SPECIES='A177' AND GEAR='053' THEN OUTPUT PA272;
PROC SORT DATA=PA272; BY COLL GEAR;
PROC SORT DATA=GL; BY COLL GEAR;
DATA PGA272GL;
MERGE PA272 GL; BY COLL GEAR;
IF SPECIES=' ' THEN TOTWGT=0.0;
IF SPECIES=' ' THEN NUM=0;
IF SPECIES=' ' THEN SPECIES='A177';
IF SITE=. OR SITE=0 THEN DELETE;
MNFWT=TOTWGT / NUM;
WTCPUE = TOTWGT / (DUR / 60);
NUMCPUE = (NUM) / (DUR / 60);
* PROC PRINT;
 TITLE 'FISH INFO A177';
* PROC PRINT;
DATA FISH;SET PGA177GL;
PROC SORT; BY SPECIES SITE;
PROC SORT; BY SITE SPECIES YEAR;
PROC MEANS DATA=FISH MEAN SUM N STD STDERR; BY SITE SPECIES YEAR;
 VAR TOTWGT NUM MNFWT WTCPUE NUMCPUE;
OUTPUT OUT=GOOD1 MEAN = WTMEAN NUMMEAN MNFWTMN WCPUEMN NCPUEMN FLTMN
                 SUM = WTSUM  NUMSUM  MNFWTSUM WCPUSUM NCPUSUM FLTSUM
                   N = WTN    NUMN    MNFWTN   WCPUEN  NCPUEN FLTN
                 STD = WTSTD  NUMSTD  MNFWTSTD WCPUSTD NCPUSTD FLTSTD
              STDERR = WTSERR NUMSERR MNFWTSER WCPUSER NCPUSER FLTSERR;
TITLE 'WEIGHT & NUMBER STATS BY SITE GEAR AND SPECIES';

RUN;
```

Output

The excel output looks like the table below.

2001

Variable	Mean	Sum	N	Std Dev	Std Error
TOTWGT	2.562773	676.572	264	5.943315	0.365786
NUM	14.45833	3817	264	33.81832	2.081374
MNFWT	0.233463	21.24511	91	0.129856	0.013613
WTCPUE	1.616105	426.6517	264	3.735217	0.229887
NUMCPUE	8.997636	2375.38	264	20.8851	1.285389

The variables are TOTWGT = total weight, NUM = number, MNFWT = mean fish weight (TOTWGT/NUM), WTCPUE = the cpue of weight, NUMCPUE = number cpue, N = the number of trap sets. Notice that N is lower for MNFWT since that N represents the number of traps that black sea bass occurred in.

The excel file called bsbcpue has the CPUE indices that the group decided should be used for the assessment.

Another excel file is included entitled “length frequency”. This file includes a length frequency of the TL (cm) of black sea bass by gear and year for the three CPUE indices.

2. MARMAP Index for Vermillion Snapper

Gear types chosen for index

The vermilion snapper life history group chose to use the shelf edge index for Florida trap (1983-1987) as well as the chevron survey for 1990-2001. Samples collected during 1988-1989 are not to be included because the gear were tethered from the boat. There is some talk of using hook and line from the inshore index during 1980-1987.

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All four gear types were fished synoptically from an anchored research vessel during 1988-1989. The MARMAP group decided that these samples should not be used since they represented a methodological change.

From 1990-2001, chevron traps have been deployed from randomly selected stations from south of Cape Canaveral, FL to Cape Lookout, NC. Trapping and hook and line gear has been used inside of 50 fathoms. Three different surveys have been conducted for reef fishes over the years.

Inshore Live Bottom Survey

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Shelf Edge Survey

Conducted with Florida traps and hook and line at four locations off SC.

Chevron trap survey

Conducted with chevron traps and hook and line gear at random locations from NC to FL. Approximately 350-400 random stations sampled from a data base of over 2,000 locations from 1990 to present.

Mean CPUE of fish caught with traps or hook and line gear is calculated for each year by species as:

$$Mean\,CPUE\,(no.\ fish\ per\ trap\text{ - }hr.) = \frac{\sum \frac{no.\ fish\ caught}{soak\ time\,(hr.)}}{no.\,samples}$$

CPUE is calculated in a similar manner for hook and line gear with the exception that soak time (duration) is multiplied by three for samples taken before 1988 since three individuals fished on a collection. Only one individual fished on each collection from 1988-2001.

Locations for the shelf edge study areas were: 3215, 7909; 3216, 7909; 3222, 7901 and 3226, 7956. The sites are ~ 50 m deep with a bottom type that consists of rock outcroppings and 1-2 m of relief. Locations of inshore index stations were: 3140, 8020; 3230, 7943; 3215,7943; 3255, 7908; 3248, 7938; 3317, 7826, 3251, 7814; 3329, 7815; 3318, 7853; 3340, 7843; 3344, 7717; 3355, 7746; 3409, 7647.

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```
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INPUT PID 1-3 COLL 4-9  GEAR $10-12 SPECIES $16-19 EST $29 @23 TOTWGT
6.3NUM 30-34 @35 SUBWGT 5.2 MEAS 40-41 DAY 234-235 MONTH 236-237
YEAR 238-239 VESSEL 244-245 LAT 330-334 LONG 335-339 @287 STRATA
$CHAR4.
DEPTH 367-369 DUR 370-372 CC 377 NAME $385-420
   LEN1 43-45 FR1 46-48 LEN2 49-51 FR2 52-54
   LEN3 55-57 FR3 58-60 LEN4 61-63 FR4 64-66
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* NOTE:  If Hnl before 1988 is used, Duration is times three
         since three people fished on a single collection.;
IF CC > 2 OR CC = 0 THEN DELETE;
 IF GEAR='324';
PROC SORT DATA=INITIAL; BY COLL GEAR;
DATA GL; SET INITIAL; BY COLL GEAR;
DROP SPECIES EST TOTWGT NUM SUBWGT;
IF FIRST.COLL OR FIRST.GEAR;
PROC SORT DATA=GL; BY YEAR SITE GEAR;
```

```
PROC MEANS MEAN SUM N STD; BY YEAR SITE GEAR;
 VAR DUR;
OUTPUT OUT=DURATION MEAN = DURMEAN
                    SUM = DURSUM
                      N = DURN
                    STD = DURSTD;
TITLE 'SAMPLING DURATION STATS BY SITE AND GEAR';
PROC SORT DATA=GL; BY GEAR;
PROC MEANS MEAN SUM N STD; BY GEAR;
 VAR DUR;
OUTPUT OUT=DURAT    MEAN = DURMEAN
                    SUM = DURSUM
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                    STD = DURSTD;
TITLE 'SAMPLING DURATION STATS BY GEAR';
DATA PA272; SET INITIAL;

IF SPECIES='A177' AND GEAR='074' THEN OUTPUT PA272;
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IF SPECIES='A177' AND GEAR='053' THEN OUTPUT PA272;
PROC SORT DATA=PA272; BY COLL GEAR;
PROC SORT DATA=GL; BY COLL GEAR;
DATA PGA272GL;
MERGE PA272 GL; BY COLL GEAR;
IF SPECIES=' ' THEN TOTWGT=0.0;
IF SPECIES=' ' THEN NUM=0;
IF SPECIES=' ' THEN SPECIES='A177';
IF SITE=. OR SITE=0 THEN DELETE;
MNFWT=TOTWGT / NUM;
WTCPUE = TOTWGT / (DUR / 60);
NUMCPUE = (NUM) / (DUR / 60);
* PROC PRINT;
 TITLE 'FISH INFO A177';
* PROC PRINT;
DATA FISH;SET PGA177GL;
PROC SORT; BY SPECIES SITE;
PROC SORT; BY SITE SPECIES YEAR;
PROC MEANS DATA=FISH MEAN SUM N STD STDERR; BY SITE SPECIES YEAR;
 VAR TOTWGT NUM MNFWT WTCPUE NUMCPUE;
OUTPUT OUT=GOOD1 MEAN = WTMEAN NUMMEAN MNFWTMN WCPUEMN NCPUEMN FLTMN
                 SUM = WTSUM  NUMSUM  MNFWTSUM WCPUSUM NCPUSUM FLTSUM
                   N = WTN    NUMN    MNFWTN   WCPUEN  NCPUEN FLTN
                 STD = WTSTD  NUMSTD  MNFWTSTD WCPUSTD NCPUSTD FLTSTD
              STDERR = WTSERR NUMSERR MNFWTSER WCPUSER NCPUSER FLTSERR;
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